

white, containing tubercle i and a very narrow dark dorsal line. The anal plate (*i. e.*, joint 14 or the tenth abdominal segment) is vinous. Lateral and subventral tubercles pale. Thoracic feet black.

*Third stage.*—Head rounded, median suture deep, shiny black, hairy; width 1.8 mm. Warts rather large, each with a hair, and other somewhat shorter hairs arise from the body. Color vinous black with pale yellow dorsal patches on joints 3 and 4, 6, 9 and 10 and 13 anteriorly, enclosing warts i and ii. A dark dorsal line, each side of which are a few yellow mottlings on the dark segments; subventral warts largely yellow, the others concolorous with the markings except row i which is dark on the yellow segments. Setae all blackish. Later, joints 5 and 12 are seen to be a little enlarged dorsally, a narrow, broken, wavy line appears along warts i in the yellow markings, the yellow patch on joints 9 and 10 extends faintly on joint 11, there is a broken, irregular, yellow, super-stigmatal line, distinct only on the yellow-marked segments and some rather more continuous yellow mottlings along the sub-stigmatal ridge.

*Fourth stage.*—Head rounded, clypeus depressed, median suture deep; hair short, dense, white; color black, slightly shiny, brownish centrally in the depression around the median suture; width 3.0 mm. Warts rather large, rows i and ii on joints 3, 4, 6, 9, 10 and 13 and all the subventral warts yellow, the others black. Joints 5 and 12 enlarged dorsally, velvety black. Color purplish black, a broad, yellow, dorsal band except on joints 5 and 12, containing a broken, triple, dorsal line, fainter on joints 7, 8 and 11. The rest of the body is purplish black, the subventral region included. Hair dense, white, consisting of fine short hairs from the body, with single, slightly longer and larger ones from the warts. As the stage advances a marked change takes place. A broad pale gray dorsal band, containing very faint triple dark line, obsolescent and broken; warts

i and ii orange, except on joints 2 and 5, row ii on joints 3, 4, 6, 9, 10 and 13 broadly orange; a broad, pale bluish, subdorsal band, heavily mottled with vinous black; joints 5 and 12 dorsally, and lateral spots on all segments (most distinct on joints 3-5), velvety black. A broad, broken, deep orange, stigmatal band, divided by an irregular black stigmatal line and consisting of orange spots spreading from the warts of rows iv and v and adjacent mottlings, barely confluent. Venter blackish; thoracic feet shiny black.

*Cocoon.*—Not different from the house made at the end of each stage, except that there are a few transverse threads to support the pupa.

*Pupa.*—Small but robust. Dorsal outline arched, ventral nearly straight, rounded at both ends; cremaster, a long spine of even thickness throughout. Smooth, shining; abdomen very slightly punctured. Color red-brown, darker ventrally and dorsally, nearly black on the thorax and cases, with a green tinge on the latter. Length 13 mm.; width 4.5 mm. There are two broods each year.

*Food plant.*—Willow (*Salix*).

*Habitat.*—Oregon and Washington west of the Cascade range and, probably, also western British Columbia. Found by Prof. O. B. Johnson at Seattle, Wash. Larva from Portland, Oregon.

#### THE MORPHOLOGY AND PHYLOGENY OF INSECTS.

The *Annals* and magazine of natural history published in December last a translation of the concluding general portion of a memoir by N. Cholodkowsky on the embryonal development of *Phyllodromia germanica* (*Mém. acad. St. Pétersb.*, 7 sér., v. 38, 1891) which closes with the following summary. It will prove interesting and suggestive to American entomologists.

1. The head of insects contains more than four protozonites, probably six, of which one is preoral, but the rest are postoral.

2. The antennae of insects belong to the first postoral segment and are entirely homologous with the remaining ventral extremities. They do not correspond to the antennae of *Peripatus*, but probably to the chelicerae of spiders, and perhaps to the second pair of antennae of Crustacea.

3. Since the possibility that a number of segments in the germinal streak of different arthropods have disappeared is not excluded, a homology of the mouth-parts of the different classes of Arthropoda cannot at present be set up.

4. The abdominal appendages of the insectan germinal streak (including the cerci) are homologous with the thoracic legs. Herein it makes no difference whether these appendages are attached to the middle, at the side, at the front, or hind margin (are meso-, pleuro-, pro-, or opisthostatic, in the terminology of Graber), provided only that their cavity is immediately continuous with that of the somite to which they belong. The fact that the abdominal appendages usually remain unsegmented in nowise tends to show that they are not of the nature of limbs, since, for instance, the mandibles also are always unsegmented.\*

5. Many of the abdominal appendages of larvae and perfect insects are homologous with the thoracic legs, even when they are secondary in ontogeny.

6. The primitive function of the first pair of the abdominal appendages was ambulatory, as also that of the remaining appendages. The ancestors of the insects were therefore undoubtedly homopod, not heteropod.

7. The many-legged insect larvae are to be derived from the six-legged just as little as are, conversely, the hexapod larvae from the polypod; both forms developed independently of one another.

8. The embryonic envelopes of the insects probably correspond to the remains of a trochosphere.

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\* Whether the segmented branchial filaments of *Sisyra* and *Sialis* belong to this category is doubtful, but can only be decided by embryological investigations.

#### WESTWOOD AND STAINTON.

The death on Jan. 2 of Prof. J. O. Westwood of Oxford at the advanced age of 87 removes the most distinguished entomologist of our time. For sixty-five years his contributions to our science have been uninterrupted and have enriched and advanced every branch of systematic entomology. No writer has made known so many singular forms, for which he seems to have had a remarkable predeliction. He had a Latreillean eye for structure and he depicted insects with rare skill; of his published drawings there must be many thousands, and they are of the utmost service to the systematist; yet his portfolios are crowded with unpublished figures. His Introduction to the classification of insects, though half a century old, is a storehouse of fact and historical statement, admirably presented and still our best general guide; but to do for the entomology of today what he did for that of 1840 would require treble the space he gave to it. No entomologist the world over has been held in such reverent esteem by Americans as Westwood.

News comes from England of the death of Mr. H. T. Stainton at the age of 70. His studies of the Tineina are well known to all American entomologists and he will be remembered especially by them for his careful collocation of the scattered papers of our own Brackenridge Clemens on the subject. Stainton did much to interest the young in entomology and edited journals especially intended for the tyro and collector. His work on the Tineina was curiously published in four different languages in parallel columns. Most of us are glad to publish in one.

ENTOMOLOGICAL NOTES.—The first volume of Moore's gigantic undertaking upon the Lepidoptera India is now completed with the publication of Part 12. This fine quarto volume, dedicated to the Empress of India and begun in 1890, contains 340 pages and 94 colored plates and yet deals with only two subfamilies of Nymphalidae—the Euploeinae and Satyrinae.

Early in 1891 Osten Sacken proposed a new